Second Five-Year Review Report

for

Syntex Facility Site

Verona, Missouri

September 2002

PREPARED BY:

U.S. Environmental Protection Agency
Region VII
Kansas City, Kansas

Approved by:

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Date:

9-27-02

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Attachments

List of Acronyms

ARARs	Applicable or relevant and appropriate requirements
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	Unites States Environmental Protection Agency
FSSP	Fish and Sediment Sampling Plan
MCL	Maximum Contaminant Level
MDHSS	Missouri Department of Health and Senior Services
MDNR	Missouri Department of Natural Resources
NCP	National Contingency Plan
NEPACCO	Northeastern Pharmaceutical and Chemical Company
NPL	National Priorities List
O&M	Operation and maintenance
OU	Operable Unit
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per trillion
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
ROD	Record of Decision
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SVOC	Semi-volatile organic compounds
VOC	Volatile organic compounds

Executive Summary

A second five-year review has been performed for the Syntex facility Superfund site located in Verona, Missouri. The Syntex facility was formerly used to manufacture 2,4,5-trichlorophenoxy-acetic acid (2,4,5-T) in the 1960s, and later hexachlorophene in the late 1960s and early 1970s. Waste streams from these processes resulted in the contamination of surface soils with 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) [dioxin] in several areas of the site and released several volatile, semi-volatile, and inorganic contaminants into the shallow ground water at the site. In addition, a trench area was used for disposal of drummed wastes from the facility.

Response actions at the site began in 1983 under an administrative order on consent. Response work at the site was eventually divided into two operable units (OUs). OU1 addressed dioxin-contaminated soils and equipment at the site and the trench area. OU2 was established to address ground water conditions. Dioxin-contaminated soils exceeding an industrial clean-up level of 20 parts per billion (ppb) at the site were excavated beginning in 1988 and transported off site for final management using the Environmental Protection Agency (EPA) mobile incinerator located at the nearby Denney Farm site. All remaining areas with surface dioxin concentrations exceeding 1 ppb were covered with either a vegetated soil layer or an asphalt cap. The trench area was protected with a gravel drainage system and capped with a vegetated soil cover, and dioxin-contaminated equipment was decontaminated and disposed off site as a solid waste.

Several ground water monitoring programs have been conducted at the Syntex facility site. The most recent ground water sampling was performed in 1997-1999 in accordance with a May 1993 Record of Decision (ROD) selecting no action with continued ground water monitoring. The results of the most recent ground water sampling were evaluated in a draft risk assessment submitted to EPA by Syntex in February 2000. This risk assessment concludes that ground water conditions at the site continue to be protective of human health and the environment. An assessment of the data by EPA as a component of this five-year review supports this conclusion. The EPA and the state of Missouri are currently working with Syntex to finalize the draft risk assessment. An ongoing ground water monitoring program will then be designed and implemented to assure that the remedy remains protective of human health and the environment.

The initial five-year review was performed at the site in 1997. At that time there remained a limited amount of response work to be performed to address contaminated equipment and a small volume of soils found to be contaminated with either polychlorinated biphenyls (PCBs) or dioxin. This response work was completed in 1998.

As part of the current five-year review, an inspection of all remediated areas was conducted on September 23, 2002, with representatives of EPA, the Missouri Department of Natural Resources (MDNR), and Syntex present. All remedial actions at the site were observed to be in place and functioning effectively. Cover systems are intact and well maintained. The remedy at the Syntex facility site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Syntex Facility

EPA ID *(from WasteLAN)*: MOD007452154

Region: 7	**State:** MO	**City/County:** Verona/Lawrence

SITE STATUS

NPL status: X Final **G** Deleted **G** Other (specify) _____

Remediation status (choose all that apply): **G** Under Construction **G** Operating X Complete

Multiple OUs?* X YES **G** NO	**Construction completion date:** 09/16/98

Has site been put into reuse? X YES **G** NO

REVIEW STATUS

Lead agency: X EPA **G** State **G** Tribe **G** Other Federal Agency _____

Author name: Robert W. Feild

Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA - Region 7

Review period: 02/28/02 to 09/20/02

Date of site inspection:

Type of review:
X Post-SARA **G** Pre-SARA **G** NPL-Removal only
G Non-NPL Remedial Action Site **G** NPL State/Tribe-lead
G Regional Discretion

Review number: **G** 1 (first) X 2 (second) **G** 3 (third) **G** Other (specify)

Triggering action:
G Actual RA Onsite Construction at OU #____ **G** Actual RA Start at OU#____
G Construction Completion X Previous Five-Year Review Report
G Other (specify) _____

Triggering action date *(from WasteLAN)*: 09/30/97

Due date *(five years after triggering action date)*: 09/30/02

* "OU" refers to operable unit.

Five-Year Review Summary Form, cont'd.

Issues:

No issues identified.

Recommendations and Follow-up Actions:

Coordinate with state of Missouri and Syntex for finalizing risk assessment.

Design and implement future ground water monitoring program.

Protectiveness Statement: The remedy at the Syntex facility site is protective of human health and the environment.

Second Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c) and the National Contingency Plan (NCP). CERCLA § 121(c) states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA), RegionVII, has conducted a five-year review of the remedial actions implemented at the Syntex facility site in Lawrence County, Missouri. This review was conducted from February 2002 through September 2002. This report documents the results of the review.

This is the second five-year review for the Syntex facility site. The triggering action for this review is the date of the first five-year review, as shown in EPA's WasteLAN database: September 30, 1997. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain on the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1
Chronology of Site Events

Event	Date
Preliminary Assessment performed	11/1980
Site Investigation performed	11/1981
Final listing on National Priorities List (NPL)	9/08/83
Consent Decree for RD/RA finalized	9/13/83
Remedial Investigation/Feasibility Study complete (OU1)	3/3/88
Proposed Plan available for public comment (OU1)	3/21/88
Record of Decision (ROD) signed (OU1)	5/5/88
Excavation of dioxin-contaminated soils commenced	5/88
Remedial design completed (OU1)	9/12/89
Remedial action construction began (OU1)	9/30/89
Remedial Investigation/Feasibility Study complete (OU2)	8/9/92
Proposed Plan available for public comment (OU2)	8/11/92
Record of Decision (ROD) signed (OU2)	5/7/93
Facility sold to DuCoa L.P.	10/96
Discovered PCB contamination in spill area around small electrical building	4/97
Administrative Order on Consent – PCB removal and complete ground water sampling	7/18/97
PCB Removal Action completion	9/29/97
Previous Five-Year Review	9/30/97
Final Inspection for OU1	1/98
Preliminary Close Out Report signed	9/16/98

Table 1
Chronology of Site Events

Event	Date
Remedial Action Report	9/25/98

III. Background

Physical Characteristics

The Syntex Agribusiness, Inc. (Syntex) facility is located west of the city of Verona, population 560, in south-central Lawrence County in southwest Missouri. The facility occupies approximately 180 acres, primarily along the east bank of the Spring River, which flows northward through the length of the property.

Most of the active portion of the facility is located within protected areas of the 100-year Spring River flood plain. The area is characterized by karst topographic features such as solution cavities and springs.

Land and Resource Use

The industrial facility is surrounded on three sides by property used for agricultural purposes. To the east of the site are the residential areas of the city of Verona. Scattered residences are located within the Spring River flood plain down gradient from the site. The Spring River is used for recreational and industrial purposes within southwestern Missouri.

History of Contamination

In the 1960s, Hoffman-Taff, Inc. owned and operated the facility. Hoffman-Taff produced 2,4,5-trichlorophenoxy-acetic acid (2,4,5-T) for the U.S. Army as part of the production of the defoliant commonly known as Agent Orange. In 1969, Hoffman-Taff leased a portion of the building at the facility to Northeastern Pharmaceutical and Chemical Company (NEPACCO) for the production of hexachlorophene. In 1969, Syntex purchased the facility at Verona from Hoffman-Taff.

The production of 2,4,5-T and hexachlorophene involved the intermediate production of 2,4,5-trichlorophenol (TCP) and the potential formation of 2,3,7,8-tetrachlorodibenzo-p-dioxin (dioxin). In the course of purifying the hexachlorophene, still bottom wastes were created which would have collected the TCP and dioxin. These waste streams were managed in storage tanks and lagoons on site.

The site was proposed for the National Priorities List (NPL) on December 30, 1982, (Federal Register Volume 47, Number 251). On September 8, 1983, the NPL designation became final (Federal Register Volume 48, Number 175). The principal threats posed by the site were direct contact (ingestion, inhalation, and dermal) with dioxin-contaminated soil and wastes

by humans and wildlife. The dioxin-contaminated soils, liquids, and sludges were also a potential source for ground water contamination.

The site also has an active plant which produces food additives for human and animal foods and is an active Resource Conservation and Recovery Act (RCRA) facility. The production plant was sold by Syntex in the fall of 1996 to a Dupont/Con Agra conglomerate identified as DuCoa, L.P. In June 2001, the facility was again sold to BCP Ingredients, a subsidiary of Balchem. Syntex maintained ownership of certain portions of the site, including the trench area, and also maintained the environmental responsibility for all actions associated with the Superfund site.

The Syntex facility site appears on the Missouri Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites. Accordingly, annual inspections of the facility are performed by the Missouri Department of Natural Resources (MDNR) staff. In May 2002, the listing of the Syntex facility site was modified to divide the site into two separate listings to reflect the current ownership.

Initial Response

The EPA and Syntex entered into an administrative order on consent in September 1983, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, and Section 3013 of RCRA, 42 U.S.C. § 6934. The order required the following actions:

- posting of warning signs around specified disposal areas;
- development and submittal of a Sampling and Analysis Plan (SAP) to define the nature and extent of dioxin contamination;
- implementation of the SAP upon approval by EPA;
- development and submittal of a Fish and Sediment Sampling Plan (FSSP) upon approval by EPA;
- implementation of the FSSP upon approval by EPA;
- preparation and submittal of a Remedial Alternatives Report; and
- preparation and submittal of an Implementation Plan that would include plans and specifications for the preferred remedial alternative(s), schedule for implementation and reporting, description of the necessary reports and safety plans.

In 1988, the EPA divided the site into two separate operable units (OUs). The contaminated soils and equipment were addressed under OU1, while the ground water contamination was addressed by OU2.

Basis for Taking Action

Surface soils at the site were determined to be contaminated with 2,3,7,8-tetrachlorodibenzp-p-dioxin above health-based levels for an industrial land use scenario. In addition, dioxin contamination detected on equipment formerly used at the site exceeded a level of concern for protection of human health. Hazardous substances disposed in the trench area posed a potential risk to human health and the environment if not properly managed.

To date, EPA has not identified an unacceptable risk to human health or the environment due to potential exposure to ground water contamination. In 1993, EPA issued a Record of Decision (ROD) selecting "no further action with continued monitoring" for the ground water operable unit at the site.

IV. Remedial Actions

Remedy Selection

In May 1988, EPA issued a ROD for OU1 that selected remedial actions for clean up of contaminated soils and equipment at the facility, and associated ground water monitoring. Pursuant to the 1983 administrative order, EPA, the MDNR, and Syntex developed an Implementation Plan to achieve the clean-up measures proposed in the ROD for OU1.

The selected remedy under OU1 was to provide protection of the environment by preventing the mobilization of dioxin-contaminated soils to the Spring River. Protection to human health would be accomplished by preventing exposure to contaminated materials through soil removal, decontamination and disposal of equipment, and capping of contaminated areas. Dioxin-contaminated soils in excess of a 20 ppb action level would be removed and treated.

Remedy Implementation

Contaminated Soils and Equipment

Clean-up measures began in June 1988, with the excavation of dioxin-contaminated soils at four former storage areas within the Spring River flood plain. The four areas included the Burn area, the Irrigation area, the Lagoon area and the Slough area. Approximately 860 cubic yards of dioxin-contaminated soil were transported to the EPA Mobile Incineration System and thermally treated. The excavated areas were then backfilled with clean topsoil and a vegetative cover was established. Remediation of these contaminated soils was completed in 1989.

Dioxin-contaminated soils located in the trench area on bluffs west of the Spring River were capped in place with a 12-inch topsoil layer which supports a vegetative cover. In addition, a gravel drainage interception trench was installed upgradient from the trench area to restrict contaminant migration. Five ground water monitoring wells were installed around the trench area for post-soil remediation ground water monitoring. The monitoring well configuration consists of an upgradient well (MW-11), two downgradient wells (MW-17, MW-18), and two flanking downgradient wells (MW-12, MW-13). Wells MW-17 and MW-18 were completed in bedrock and screened across the alluvium/bedrock contact. The activities associated with the trench area were also completed in 1989. In 1996, additional work was initiated to replace several wells

around the trench area as well as install wells in order to collect additional information regarding the ground water around the trench area. Wells MW-12, MW-13, and MW-17 were replaced with closely located similar wells. Well MW-18 was modified and two new wells were installed. Well MW-19 was installed as a new downgradient well, and well MW-20 was installed as a new upgradient well. There are now six wells surrounding the trench area (MW-11, MW-12, MW-13, MW-17, MW-18, MW-19, and MW-20).

In 1995, all equipment and debris were removed from the spill area and the area was covered with an asphalt cap. No excavation was required in this area because the concentration of dioxin contamination was below the 20 ppb action level. The original plan called for a vegetative cap, but the owner wished to use the area for parking and movement of vehicles and equipment so an asphaltic cap was substituted. The EPA and the state agreed that this cap would be as protective as a vegetative cap. The cap will be maintained in perpetuity.

Decontamination procedures were developed to clean the contaminated NEPACCO and photolysis equipment. The procedures were implemented and approximately 75 percent of the equipment were treated. The land disposal restrictions posed problems in the disposal of the treated equipment. In 1996, a determination was made by EPA, under the hazardous debris rule, that the developed procedures would adequately protect human health and the environment and allow the treated equipment to be disposed as a solid waste. All of the equipment have since been properly treated and disposed.

Additional measures have been implemented beyond the selected remedy that provide further protection of human health and the environment. An eight-foot chain-link fence was erected around the perimeter of the site to limit access. The state of Missouri has also implemented institutional controls on the site limiting changes in land use by placing the site on a State Registry. The Syntex Verona site has been placed on the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri as the "Syntex Facility (Verona) Site." The site is currently classified on the Registry as a Class "3" site. Class 3 sites are sites that do not present a significant threat to public health or the environment where action may be deferred. Missouri Code section 260.465 describes the authority of the MDNR with respect to use and transfer of sites on the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites. There are no specific restrictions for this site. In summary, a person shall not substantially change the manner in which a Registry site is used or sell or transfer title of a Registry site without written approval of the Director of the MDNR.

Groundwater

In accordance with the Implementation Plan prepared pursuant to the 1983 consent order, ten ground water monitoring wells were completed into the alluvium at the Syntex facility site beginning in August 1985. Several organic compounds were tentatively identified in shallow ground water at the site. The OU1 ROD issued May 5, 1988, concluded that ground water data generated from the initial ten monitoring wells were insufficient to determine ground water monitoring needs at that time. The ROD required further monitoring to determined the nature and extent of potential ground water contamination at the site.

Subsequent to the 1988 OU1 ROD, the Verona OU2 Implementation Plan was developed to define additional ground water monitoring characterization needs. Beginning in September 1989, an additional 11 ground water monitoring wells were installed to provide the required post-remediation monitoring. The resulting 21-well network has been used to determine the flow characteristics of ground water at the site and to more accurately define the extent of low-level organic and inorganic constituents in the ground water at the site.

Ground water monitoring between January 1991 and April 1992 detected the presence of three compounds above Maximum Contaminant Levels (MCLs) including dichloromethane, 1,1- dichloroethane, and toluene. In addition, acetone and chlorobenzene were detected, for which there were no MCLs available at that time. Nine inorganic constituents were identified above MCLs including arsenic, barium, cadmium, chromium, lead, selenium, antimony, nitrate, and fluoride. Three additional inorganic constituents, iron, chlorides, and manganese were detected above secondary MCLs. The MCLs are standards utilized by municipal water supplies and are referenced for comparison purposes. The MCLs do not constitute Applicable or Relevant and Appropriate Requirements (ARARs) for this site.

A baseline risk assessment using assumptions about maximum exposures that could reasonably be expected for an individual at or near the site was prepared by EPA on the basis of data generated from 1991 through 1992. The baseline risk assessment concluded that the risks posed by contaminants detected in ground water from the site were within the acceptable risk range at that time.

In May 1993, EPA issued a ROD for OU2 at the Syntex facility site addressing ground water conditions. The ROD concluded that an inexactly defined area of metals and organic contamination was present at various times, and noted that dioxin had been reported at a concentration of 5.3 parts per trillion (ppt) in a single sample. The ROD concluded that ground water leaving the site would discharge into the Spring River, and that volatilization and biodegradation would remove at least some constituents before reaching the river. The ROD recognized that three private residential wells located downgradient of the site were sampled and no contamination was detected.

The remedy selected in the 1993 OU2 ROD was “no action with continued ground water monitoring.” The ROD required preparation of a risk assessment at the conclusion of a two-year ground water monitoring program to assure that the “no action approach remains protective of human health and the environment.” The ROD also required installation of additional upgradient and downgradient monitoring wells.

Operation and Maintenance

All covered areas are maintained by the current site owner, BCP Ingredients, with the exception of the trench area, which is maintained by Syntex. Vegetation is maintained through

routine visual inspections and repair as necessary. Shallow ground water in the area contributes to the sustainability of dense vegetation. Maintenance requirements for asphalt caps similarly involve routine visual inspection and repair as necessary. All cover systems are currently inspected at least quarterly. In addition, the covers are inspected annually by MDNR personnel due to the Registry listing.

V. Progress Since the Last Review

In March 1997, while performing decontamination procedures on an exterior concrete dike (the former T-1 dike) located on the spill area of the site, dioxin contamination was discovered in soils surrounding the dike. The soils contaminated with dioxin at concentrations exceeding 20 ppb were excavated and transported to a commercial incinerator in Coffeyville, Kansas, for thermal treatment. This work was conducted in conjunction with the removal action to address polychlorinated biphenyl (PCB) contamination in soil discussed below. The excavated areas were backfilled with a minimum of one foot of clean soil and capped with an asphaltic cover. These actions were completed in December 1997.

At the time of the last five-year review, a limited amount of contaminated equipment, drummed wastes, and decontamination water were located inside a large covered building (photolysis building) next to the spill area. This building was used for the decontamination of the final equipment. Following the equipment decontamination, drummed wastes and decontamination water was removed and managed off site. The building was successfully decontaminated and put back into active use by the site owners.

In April 1997, as part of a trenching operation near a small electrical building in the spill area of the site, soil was excavated for the purpose of burying elevated power lines. Since the electrical building had historically stored PCB transformers that had developed leaks, a composite sample was taken of the excavated soil to analyze for potential PCB contamination. Analysis of the soil sample indicated the presence of PCB contamination at 1,000 parts per million (ppm). In response to the discovery of PCB contamination, EPA issued a Removal Action Memorandum on July17, 1997, identifying the response actions necessary to address the PCB contamination. The removal action activities were conducted by Syntex under an administrative order on consent dated July 1997. The removal actions to address the PCB contamination were initiated in August 1997 and completed in December 1997. The PCB-contaminated materials were transported to a commercial hazardous waste incinerator located in Coffeeville, Kansas, for final management. This completed response actions under OU1 for the site.

In accordance with the 1993 OU2 ROD, ground water monitoring was performed during eight quarterly sampling events from November 1997 to August 1999. Samples were analyzed for select volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, dioxins, metals, and other inorganics. The identified chemicals of concern detected in the ground water monitoring program included dioxin, barium, bis(2-ethylhexyl) phthalate, cadmium, chlorobenzene, chromium, and manganese.

A draft risk assessment was prepared and submitted to EPA in February 2000 to characterize risks associated with exposure to hazardous constituents detected in the 1997-1999

ground water monitoring program. The draft risk assessment concludes that risks due to potential exposure to ground water remain within the acceptable risk range. The draft risk assessment has been reviewed by EPA and the Missouri Department of Health and Senior Services (MDHSS).

VI. Five-Year Review Process

Administrative Process

The five-year review process was conducted by the Remedial Project Manager (RPM) for the site, Robert Feild. The designated contact for Syntex, Mr. Kevin Cassil of the Forrester Group, was contacted on March 19, 2002, and notified that the five-year review process was planned to be completed by the end of September 2002. On May 16, 2002, Ms. Pia Capell, Site Manager for the MDNR, was notified that the five-year review process for the Syntex facility site was being performed.

Community Involvement

In June 2002, an administrative record was assembled containing documents that were referenced to perform the five-year review at the Syntex facility site. A fact sheet was prepared by EPA announcing the initiation of the five-year review process and mailed to 56 individuals appearing on the mailing list for the site on July 5, 2002. A copy of the administrative record supporting the five-year review was made available to the public at the Verona City Hall on July 18, 2002.

Public notices announcing the five-year review process were advertized in several local newspapers. On June 6, 2002, notices appeared in the Aurora Advertizer and the Lawrence County Record. On July 10, 2002, a notice appeared in the Monette Times.

No comments or contacts were received from the public during the five-year review process.

Document Review

This five-year review consisted of a review of relevant documents including RODs, Administrative Orders, Implementation Plans, the Remedial Action Report, the initial Five-Year Review Report, the Preliminary Close-Out Report, and the draft Ground Water Risk Assessment Report for the site. Relevant documents reviewed during this five-year review are listed in Attachment 2 of this report.

Data Review

The historic remedy at the site for dioxin-contaminated soils involved excavation and removal of surface soils exceeding 20 ppb 2,3,7,8-TCDD. Dioxin is extremely stable and persistent, and no substantial change in site concentrations is envisioned. No additional soil

sampling data have been generated since sampling confirmed that residual site concentrations are less than 20 ppb. Additional soil sampling is not warranted to confirm the continued effectiveness of the remedy.

Quarterly ground water sampling was performed for eight quarters from November 1997 through August 1999. Analysis for 36 constituents was performed in accordance with the May 1995 OU2 Implementation Plan. A summary of the generated data is provided in Attachment 3 to this report. A draft risk assessment has been prepared to characterize risks due to exposure to ground water at this site. The draft risk assessment concludes that site risks are within an acceptable range at this time. An assessment of this recent data by EPA as a component of this five-year review supports this conclusion. The EPA and the state of Missouri have completed a review of the draft risk assessment.

Site Inspection

A site inspection was performed on September 23, 2002, by the EPA RPM. The purpose of the visit was to perform an inspection in order to complete the five-year review process. Participating in the inspection were Ms. Pia Capell, Site Manager for MDNR, Mr. Kevin Cassil and Ms. Sara Garrettson, both of the Forrester Group representing Syntex, and Mr. Mark Conn, an escort provided by the current site owner, BCP Ingredients. During the site inspection, the condition of the vegetated soil covers was observed at the trench area, burn area, irrigation area, lagoon area, and slough area; and the condition of asphalt covers was evaluated at the spill area and the T-1 dike area. The RPM noted the following observations relating to the current status of the site and the continued protectiveness of the response actions:

A. The soil and vegetative covers were intact and in good condition. Very thick vegetation was found in all covered areas;

B. The fences surrounding the facility were in good condition;

C. The monitoring wells on the site were observed and looked to be in good condition and functional;

D. The asphalt covers over the spill area and T-1 dike area were intact and in good condition;

E. Access to the facility is controlled through a security gate; and

F. Access to the burn area and trench area is through a locked gate. Both areas are designated with a posted wire fence.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The reviews of site documents, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is continuing to function as intended by the RODs. The excavation and capping of contaminated soil has achieved the remedial objectives of controlling the potential for human exposure to contaminated soil and limiting the potential for future off-site migration of contaminants. All asphaltic and vegetated soil covers were observed to be in good condition. All contaminated equipment have been effectively decontaminated and removed from the site. After observing the decline in dioxin levels in fish tissue samples, the MDHSS removed the previously imposed fish advisory issued for the Spring River.

Ground water monitoring has continued in accordance with the OU2 ROD. Assessment of ground water data collected to date has indicated that ground water conditions at the site remain protective of human health.

Maintenance of covered areas is performed by BCP Ingredients personnel, and was observed to be sufficient to maintain covered surfaces. All asphalt caps and vegetated soil covers were intact and in good condition. No opportunities were identified to reduce the ongoing operation and maintenance requirements. No issues or problems were identified relative to the remedy.

Although not a component of the selected remedy, access controls and institutional controls are in place and provide further protection of human health and the environment. Access to all remediated areas is permitted through either locked gates or a security gate. The appearance of the site on the State Hazardous Waste Registry assures that land use will remain consistent with the implemented remedy. No additional response actions are necessary to assure the continued protection of human health and the environment.

Question B: Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the land use assumptions that would affect the protectiveness of the remedy. Remedial action objectives which were fully developed in the 1997 Five-Year Review Report for the Syntex facility site remain valid. There are no newly identified contaminants, contaminant sources, or human health or ecological routes of exposure that could affect the protectiveness of the remedy. There are no toxic byproducts of the

remedy. There have been no changes to standards identified in the site RODs or newly promulgated standards that would call into question the protectiveness of the remedy. Toxicity factors or other contaminant characteristics have not changed.

During site clean-up activities, dioxin-contaminated soils exceeding 20 ppb were removed and managed off site in accordance with recommendations from the Agency for Toxic Substances and Disease Registry and the MDHSS. These agencies continue to support a clean-up level of 20 ppb in similar industrial settings. Additionally, OSWER Directive 9200.4-26, issued April 13,

1998, recommends dioxin clean-up levels in the range of 5 to 20 ppb in industrial settings unless extenuating site-specific circumstances warrant different levels. There are no identified site-specific circumstances that would justify a departure at this time from the 20 ppb clean-up level at the Syntex facility site.

Ground water data continue to be collected and assessed on the basis of protection of human health and the environment. The most current risk assessment continues to support that ground water conditions are protective of human health and the environment. This risk assessment is consistent with standardized risk assessment methodologies.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has been identified that would call into question the protectiveness of the remedy. The site-specific assessment of ground water conditions continues to demonstrate protection of human health and the environment. There are no newly identified ecological risks, and there are no impacts from natural disasters.

Since the early 1990s, EPA has been working on a reassessment of the risks associated with exposure to dioxin. This reassessment has involved peer review inside and outside the Agency and has resulted in the release of a draft report in 1994 and more recent revisions to several critical sections released in 2001. Although the draft EPA dioxin reassessment suggests that some assumptions in the science of dioxin-risk assessment could change, it is unclear whether, and to what extent, these changes will ultimately impact Superfund clean-up levels. It remains EPA policy to remediate dioxin-contaminated sites in the Superfund program in accordance with OSWER directive 9200.4-26. The dioxin clean up performed at the Syntex facility site remains consistent with that OSWER directive.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the RODs. There have been no changes to the physical conditions of the site that would affect the protectiveness of the remedy. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There have been no changes in land usage or exposure opportunities that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site operations, conditions, or activities that prevent the remedy from being fully protective.

IX. Recommendations and Follow-up Actions

For all of the follow-up actions listed in Table 2, Syntex is the party responsible for

implementing the actions, and the EPA is the lead oversight agency. The MDNR continues to be consulted and involved in site activities.

Table 2
Follow-up Actions

Recommendations and Follow-up Actions	Milestone Date	Affects Protectiveness (Y/N)	
		Current	Future
Finalize draft risk assessment report for ground water monitoring	February 2003	N	N
Develop and finalize future ground water monitoring program.	August 2003	N	N

X. Protectiveness Statement

The remedy at the Syntex facility site is protective of human health and the environment.

XI. Next Review

The next five-year review for the Syntex facility site is required by September 27, 2007, five years from the date of this review.

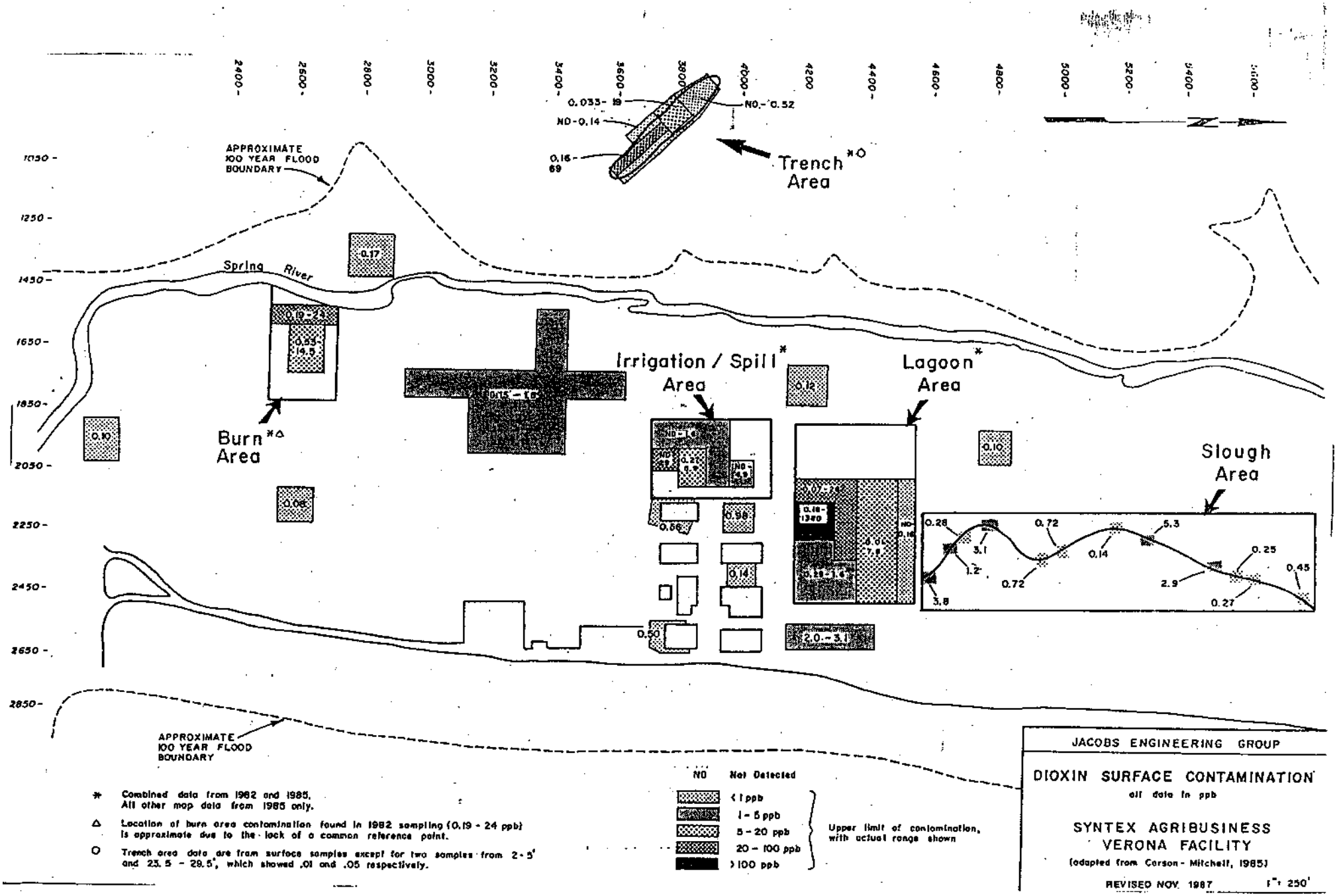
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
4600
4800
5000
5200
5400
5600
1050
1250
1450
1650
1850
2050
2250
2450
2650
2850
0.033 - 19
ND - 0.14
0.16 - 69
ND - 0.52
Trench Area
APPROXIMATE 100 YEAR FLOOD BOUNDARY
Spring River
0.17
0.19 - 24
0.33 - 14.5
0.15 - 1.6
Irrigation / Spill Area
Lagoon Area
0.12
Burn Area
0.10
0.06
Slough Area
0.28
3.1
1.2
3.8
0.72
0.72
0.14
5.3
2.9
0.25
0.27
0.45
0.98
0.14
0.50
2.0 - 3.1
APPROXIMATE 100 YEAR FLOOD BOUNDARY
* Combined data from 1982 and 1985. All other map data from 1985 only.
△ Location of burn area contamination found in 1982 sampling (0.19 - 24 ppb) is approximate due to the lack of a common reference point.
○ Trench area data are from surface samples except for two samples from 2 - 5' and 23.5 - 29.5', which showed .01 and .05 respectively.
ND Not Detected
< 1 ppb
1 - 5 ppb
5 - 20 ppb
20 - 100 ppb
> 100 ppb
Upper limit of contamination, with actual range shown
JACOBS ENGINEERING GROUP
DIOXIN SURFACE CONTAMINATION
all data in ppb
SYNTEX AGRIBUSINESS
VERONA FACILITY
(adapted from Carson - Mitchell, 1985)
REVISED NOV. 1987
1" = 250'

figure 1.1

Attachment 2
List of Documents Reviewed

- Consent Decree and Agreement in the matter of Syntex Agribusiness, Inc., United States Environmental Protection Agency, September 13, 1983.
- Record of Decision for Final Management of Dioxin Contaminated Soil and Equipment at Syntex Agribusiness, Inc., Verona, Missouri, United States Environmental Protection Agency, May 5, 1988.
- Syntex Agribusiness, Inc. Verona Facility Implementation Plan, Syntex Agribusiness, Inc., July 29, 1988.
- Response and Clarification to Comments Concerning the Remedial Actions at the Verona Facility, J. Kevin Cassil, Syntex Agribusiness, Inc., May 25, 1989.
- Syntex Agribusiness, Inc., Verona, Missouri, Implementation Plan Ground Water Report, Final Report, Radian Corporation, August, 1991.
- Record of Decision, Ground Water Operable Unit # 2, Syntex Agribusiness, Inc., Verona, Missouri, May 7, 1993,
- Site Review and Update, Syntex Facility – Verona, Missouri Department of Health Bureau of Environmental Epidemiology in Cooperative Agreement with the Agency for Toxic Substances and Disease Registry, August 27, 1993.
- OU2 Implementation Plan for Syntex Agribusiness Inc. Verona, Missouri Facility, Radian Corporation, May, 1995.
- Remedial Action Report, Syntex Facility Remedial Action, Operable Unit 1, Verona, Missouri, Environmental Protection Agency, September 25, 1998.
- Administrative Order on Consent for Response Actions in the matter of Syntex Facility Site, Verona, Lawrence County, Missouri, July 18, 1997.
- Five-Year Review Report, Syntex Verona Facility, Verona Missouri, Environmental Protection Agency, September 30, 1997.
- Superfund Site Preliminary Closeout Report, Syntex Facility – Verona Site, Verona, Missouri, Environmental Protection Agency, September 16, 1998.
- Draft Risk Assessment Report, Operable Unit 2 (OU2) at the former Syntex Agribusiness, Inc. Facility Superfund Site, Verona, Missouri, S.M. Stoller Corporation, February 14, 2000.

- Correspondence, Daryl W. Roberts, Director, Section for Environmental Public Health, Missouri Department of Health, To Judy Facey, United States Environmental Protection Agency, April 26, 2000.

- Memorandum, “Risk Assessment for Operable Unit 2 (OU2) at the former Syntex Agribusiness, Inc. Facility Superfund site, Verona, Missouri, Judy Facey, Toxicologist to Bob Feild, Remedial Project Manager, Unites States Environmental Protection Agency, September 28, 2000.

- Memorandum, “Risk Assessment for Operable Unit 2 (OU2) at the former Syntex Agribusiness, Inc. Facility Superfund site, Verona, Missouri”, Judy Facey, PhD, Toxicologist, to Bob Feild, Remedial Project Manager, July 16, 2002.

Table 3-3
Monitoring Well (All MW-# Sample Locations) Analytical Data Summary Statistics (a)
OU2 at the Syntex Facility Superfund Site, Verona, Missouri

Analyte	Units	Number Detected	Number of Samples	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Detection Limit	Maximum Detection Limit	Arithmetic Mean [b]	Median	Standard Deviation	Shapiro Wilk P Value Normal [c]	Shapiro Wilk P Value LogNormal [c]	UCL95 Normal [d]	UCL95 LogNormal [e]	UCL95 NonParametric [f]	Basis for On-site GW EPC [g]
1,1,2,2-Tetrachloroethane	ug/l	1	118	0.8%	6	6	5	25	2.68	2.5	1.04	0	0	2.84	2.73	2.86	UCL95
1,2,4,5-Tetrachlorobenzene	ug/l	0	128	0.0%			10	62	5.88	5	3.46	0	0	6.19	5.78	6.24	ND
1,2,4-Trichlorobenzene	ug/l	1	132	0.8%	0.5	0.5	10	62	5.47	5	2.99	0	0	5.9	5.68	5.84	Max
1,3-Dichlorobenzene	ug/l	10	132	7.6%	0.6	4	10	62	5.23	5	3.17	0	0	5.68	5.79	5.74	Max
1,4-Dichlorobenzene	ug/l	37	117	31.6%	1	18	5	10	3.85	2.5	3.09	1.11E-16	4.21E-14	4.33	4.07	4.33	UCL95
1,4-Dioxane	ug/l	2	117	1.7%	100	360	500	2500	271	250	108	0	0	288	279	289	UCL95
2,3,7,8-TCDD	ng/l	2	112	1.8%	0.137	0.56	0.02	10000	44.9	0.045	472	0	2.22E-16	119	0.334	134	Max
Acetone	ug/l	7	118	5.9%	1	48	1	20	5.86	5	4.76	0	0	6.59	6.13	6.65	UCL95
Antimony	ug/l	1	113	0.9%	4.2	4.2	0.06	60	3.79	2	6.01	0	0	4.73	3.91	4.67	Max
Arsenic	ug/l	102	113	90.3%	3	99.8	4	8	23.8	20.9	20.2	1.44E-08	0.000177	27	32.7	26.8	UCL95
Barium	ug/l	113	113	100.0%	40.2	3560			883	802	702	2.1E-06	7.48E-07	993	1370	995	UCL95
Bis(2-ethylhexyl)phthalate	ug/l	60	132	45.5%	0.5	310	10	62	9.67	5	36.9	0	3.3E-13	15	7.46	14.7	UCL95
Cadmium	ug/l	30	113	26.5%	2.7	18	3	25	3.1	1.5	3.11	3.33E-16	2.91E-14	3.59	3.3	3.59	UCL95
Calcium	ug/l	113	113	100.0%	14200	869000			117000	72600	130000	0	2.29E-08	137000	123000	139000	UCL95
Chlorobenzene	ug/l	60	118	50.8%	1	310	5	5	37.7	2.5	72	0	4.34E-11	48.7	50.6	49	UCL95
Chromium	ug/l	98	113	86.7%	6	1960	5	10	83.2	25.6	221	0	0.0107	118	105	120	UCL95
Ethylbenzene	ug/l	14	118	11.9%	1	10	5	10	2.93	2.5	1.46	0	0	3.15	3.04	3.15	UCL95
Heptachlor	ug/l	0	121	0.0%			0.02	0.075	0.0202	0.02	0.00256	0	0	0.0206	0.0206	0.0205	ND
Heptachlor epoxide	ug/l	1	121	0.8%	0.162	0.162	0.04	0.075	0.0219	0.02	0.0132	0	0	0.0239	0.0222	0.0242	UCL95
Hexachlorophene	ug/l	0	128	0.0%			50	1200	108	100	60.1	0	0	117	112	119	ND
Inorganic Chloride	ug/l	112	112	100.0%	1400	325000			62500	31000	73800	3.34E-12	7.15E-05	74000	118000	74700	UCL95
Iron	ug/l	113	113	100.0%	1060	285000			48300	34000	46300	1.02E-10	0.000289	55500	72500	45600	UCL95
Lead	ug/l	112	113	99.1%	3.2	162	3	3	36.9	23.5	36.8	1.32E-10	0.0397	42.7	49.8	42.6	UCL95
Magnesium	ug/l	113	113	100.0%	2820	92800			10300	8440	9740	0	0.00276	11800	11100	12000	UCL95
Manganese	ug/l	113	113	100.0%	241	24900			6090	4910	5020	7.8E-09	1.25E-05	6870	8690	6800	UCL95
Methylene chloride	ug/l	17	118	14.4%	1	18	5	10	3.08	2.5	2.3	0	0	3.44	3.17	3.42	UCL95
Naphthalene	ug/l	8	132	6.1%	0.5	6	10	62	5.32	5	3.11	0	0	5.77	5.78	5.8	UCL95
Nitrate plus Nitrite (as N)	ug/l	41	113	36.3%	20	840	30	200	116	50	129	1.55E-15	6.83E-11	135	127	136	UCL95
Phenols	ug/l	0	113	0.0%			50	54	25	25	0.188	0	0	25	25	25.1	ND
Selenium	ug/l	2	113	1.8%	10.1	12.6	4	100	3.4	2	5.15	0	0	4.2	3.33	4.24	UCL95
Sodium	ug/l	113	113	100.0%	3410	40400			17700	17400	9720	3.05E-05	4.83E-05	19200	20300	19100	UCL95
Sulfate	ug/l	109	113	96.5%	200	53000	200	200	6030	4900	8220	6.06E-14	1.14E-06	7000	10500	6980	UCL95
Tetrachloroethene	ug/l	1	118	0.8%	5	5	5	20	2.65	2.5	0.82	0	0	2.77	2.71	2.78	UCL95
TOC	ug/l	77	112	68.8%	1000	35000	1000	2000	4350	2200	6220	1.11E-15	0.000118	5320	5380	5360	UCL95
Toluene	ug/l	13	118	11.0%	1	42	5	10	4.42	2.5	7.31	0	0	5.53	4.09	5.51	UCL95
Xylene (total)	ug/l	22	118	18.8%	1	88	5	10	7.35	2.5	15.6	0	0	9.73	6.23	9.95	UCL95

Notes:
ND = Not Detected
UCL95 = 95 Percent Upper Confidence Limit on the arithmetic mean
Shading indicates appropriate test statistic
[a] Statistics were calculated for all monitoring well (MW-#) sample locations. Sample locations IS-6 (background location) and N-RIVER and S-RIVER (surface water locations) were not included.
[b] Arithmetic mean calculated assuming one-half the sample quantitation limit for nondetected data.
[c] Shapiro Wilk test: data is distributed normally or lognormally as specified where p-value >0.05 (95%).
[d] UCL95 Normal based on Student's t-Test.
[e] UCL95 Lognormal based on Land's parametric method.
[f] UCL95 Nonparametric based on nonparametric "bootstrap" algorithm.
[g] Exposure Point Concentration (EPC) is represented by the UCL95. If the UCL95 is greater than the maximum detected concentration (Max), then the EPC is represented by the Max.
The EPC for the monitoring wells (MW-#) is used to represent on-site groundwater exposure.